



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N4

(8080104)

**19 April 2021 (X-paper)
09:00–12:00**

This question paper consists of 4 pages.

243Q1A2119

**DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA**

**NATIONAL CERTIFICATE
FAULT FINDING AND PROTECTIVE DEVICES N4
TIME: 3 HOURS
MARKS: 100**

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
 2. Read all the questions carefully.
 3. Number the answers according to the numbering system used in this question paper.
 4. Sketches must be large, neat and clear and may be done in pencil.
 5. Use only a black or blue pen.
 6. Write neatly and legibly.
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QUESTION 1

- 1.1 Answer the following questions with regard to the nine-point plan:
- 1.1.1 Name and describe FIVE factors that can influence your decision when asking what the facts are with regard to the occurring of a fault. (5 × 2) (10)
- 1.1.2 What are the facts?  (3)
- 1.2 Explain the term *corrective maintenance*. (2)
- 1.3 Name and explain FIVE different aids concerning the documentation of fault finding. (5 × 2) (10)
- [25]**

QUESTION 2

- 2.1 Make a sketch of an automatic star-delta motor starter for a three-phase induction motor. (8)
- 2.2 State SIX common problems that occur when misleading results are obtained while using testing equipment. (6)
- 2.3 Why does the moving-coil instrument need a low shunt resistance?  (3)
- 2.4 Name TWO methods of damping in moving-coil instruments. (2)
- [19]**

QUESTION 3

- 3.1 Complete the following sentences by writing only the missing word next to the question number (3.1.1–3.1.3) in the ANSWER BOOK.
- 3.1.1 The amplitude of the displayed voltage signal is controlled by the (a) ... The calibration setting on the attenuator switch gives the rate of (b) ... in (c) ... per centimetre or volts per (d) ...  (4)
- 3.1.2 The inside of the screen is coated with a/an ... layer. (2)
- 3.1.3 The CRO gives an electronic ... display. (2)
- 3.2 Make a sketch to show how a thermistor can be used to control temperature. (5)
- 3.3 What does an electromagnetic overload unit consist of?  (3)
- [16]**

QUESTION 4

- 4.1 Which type of current flows in the core of a coil and what does it cause? (2)
- 4.2 Define the term *inductance*.  (3)
- 4.3 Make a labelled sketch of a properly biased NPN transistor and indicate the emitter, base and collector junctions as well as the arrow heads of the currents. (6)
- [11]**

QUESTION 5

- 5.1 Draw an SCR switching circuit where an SCR is used to control the power from a DC source into the load resistor. (6)
- 5.2 What can happen if the sweep is not triggered correctly? (3)
- 5.3 Make a sketch of an electrical symbol for a ferrite core.  (2)
- [11]**

QUESTION 6

- 6.1 Simplify the expression:
- $$\overline{\overline{xy + xyz} \cdot (\overline{xyz} + \overline{xyz})}$$
- (6)
- 6.2 Draw the truth table of the following expression:
- $$(A + B)(A + C) = A + BC$$
-  (8)
- 6.3 Complete the following laws and identities of Boolean algebra:
- 6.3.1 $A(A + B)$
- 6.3.2 $A + AB$
- 6.3.3 $\overline{\overline{A}}$ 
- 6.3.4 $A + 0$

(4 × 1) (4)
[18]

TOTAL: 100